WHAT IS CLAIMED IS:

1. A high-frequency piezoelectric oscillator including a piezoelectric vibrator having a piezoelectric element that is excited in a predetermined frequency, and an oscillation amplifier that oscillates the piezoelectric element by flowing current to the piezoelectric element, wherein

an inductor and a resistor are insertion connected in parallel respectively to the piezoelectric vibrator of the high-frequency piezoelectric oscillator, and resonance frequency of a parallel resonance circuit consisting of the inductor and the resistor is set to the vicinity of the oscillation frequency of the high-frequency piezoelectric oscillator thereby to increase negative resistance applied to a series arm of the piezoelectric element and suppress unwanted oscillation due to the inductor.

2. A high-frequency piezoelectric oscillator including a piezoelectric oscillator having a piezoelectric vibrator that is excited in a predetermined frequency, and an oscillation amplifier that oscillates the piezoelectric vibrator by flowing current to a piezoelectric element, wherein

a circuit having an inductor and a variable capacitance diode connected in series and a resistor are insertion connected in parallel respectively to the piezoelectric vibrator of the high-frequency piezoelectric oscillator, resonance frequency of a parallel resonance circuit consisting of the inductor and

the resistor is set to the vicinity of the oscillation frequency of the high-frequency piezoelectric oscillator, thereby to increase negative resistance applied to a series arm of the piezoelectric element and externally fine adjust the capacitance of the variable capacitance diode so as to optimize oscillation and make it possible to control frequency.

3. A high-frequency piezoelectric oscillator including a piezoelectric oscillator having a piezoelectric vibrator that is excited in a predetermined frequency, and an oscillation amplifier that oscillates the piezoelectric vibrator by flowing current to a piezoelectric element, wherein

a first inductor and a resistor are connected in parallel respectively to the piezoelectric vibrator of the high-frequency piezoelectric oscillator, the connection point is grounded via a circuit having a second inductor and a variable capacitance diode connected in series, and resonance frequency of a parallel resonance circuit consisting of the first inductor and the resistor is set to the vicinity of the resonance frequency of the high-frequency piezoelectric oscillator, thereby to increase negative resistance applied to a series arm of the piezoelectric element and externally fine adjust the capacitance of the variable capacitance diode so as to optimize oscillation and make it possible to control frequency.

4. A high-frequency piezoelectric oscillator according to any one of claims 1 to 3, wherein

the following relationships are fulfilled:

$$R_1 + R_L = 0$$

$$\omega L_1 + \frac{1}{\omega . C_1} + X_L = 0 \qquad \cdots\cdots\cdots \text{(I)}$$

when

$$X_0 = \frac{1}{\omega C_0} \times \frac{1}{\left(1 - \frac{\omega_0^2}{\omega^2}\right)} = \frac{1}{\omega C_0} \times \frac{1}{\left(\frac{\omega_0^2}{\omega^2} - 1\right)}$$

$$z_0 = \frac{R_0 X_0^2}{R_0^2 + X_0^2} + j\frac{X_0 R_0^2}{R_0^2 + X_0^2}$$

$$r_\alpha = \frac{R_0 X_0^2}{R_0^2 + X_0^2}, \cdots\cdots\cdots X_\alpha = \frac{X_0 R_0^2}{R_0^2 + X_0^2}.$$

$$Z_L = \frac{-r_\alpha R_c + X_\alpha X_c - j\left(X_\alpha R_c + X_c r_\alpha\right)}{r_\alpha - R_c + j\left(X_\alpha - X_c\right)} \cdots\cdots\cdots$$

$$A = r_\alpha - R_c, \cdots\cdots B = X_\alpha - X_c, \cdots C = R_c^2 + X_c^2, \cdots\cdots\cdots D = r_\alpha^2 + X_\alpha^2$$

$$R_L = \frac{r_\alpha \times C - R_c \times D}{A^2 + B^2}, \cdots\cdots\cdots X_L = \frac{X_c \times D - X_\alpha \times C}{A^2 + B^2}.$$

where -Rc represents the negative resistance, Cc represents circuit capacitance, C0 represents interelectrode capacitance of the piezoelectric vibrator, X0 represents reactance of a parallel circuit of the inductor L0, R0 represents resistance of the resistor, -Xc represents circuit capacitance

of the circuit, rα represents parallel connection resistance of the X0 and R0, Xα represents reactance, RL represents negative resistance of the series arm of the oscillator, XL represents reactance, and (I) represents an oscillation condition.

5. A high-frequency piezoelectric oscillator according to claim 1, wherein

$\omega_1 < \omega_T < \omega_2$ (Exp. 1) is fulfilled, when

ω_T represents unwanted resonance non-angular frequency, C_o represents interelectrode capacitance of the vibrator, Rc represents an absolute value of negative resistance of an additional resistor and an oscillation circuit that are connected in parallel to the C_o, L_o represents an inductor that is connected in parallel to the C_o, and ω_0 represents parallel resonance angular frequency of the C_o and L_o, where

(Exp. 2) to (Exp. 4) is fulfilled

$$\omega_1 = \sqrt{\omega_0^2 + \frac{K - \sqrt{K\left(K + 4\omega_0^2\right)}}{2}}, \quad \omega_2 = \sqrt{\omega_0^2 + \frac{K + \sqrt{K\left(K + 4\omega_0^2\right)}}{2}}, \quad K = \frac{M}{C_0^2 R_0^2}, \quad M = \frac{R_0}{R_c} - 1$$

M>0, R_0>Rc · · · · · (Exp.2)

$$\cdots \cdot_T = \cdot_2 - \cdot_1 = \sqrt{\frac{K^2}{4 \cdot_0^2} + K} = \frac{\cdot_0}{2Q_0}\sqrt{M\left(4Q_0 + M\right)} \cdot\cdot \quad \text{(Exp.3)}$$

.... T: unwanted resonance non-angular bandwidth

$$\cdots Q = \frac{R_0}{\cdot_0 L_0} = \cdot_0 C_0 R_0 \cdots \quad \text{(Exp.4)}$$

the (Exp. 1) represents unwanted resonance non-angular bandwidth, (Exp. 2) represents a condition for fulfilling the (Exp. 1), and (Exp. 3) represents an unwanted band,

(Exp. 5) is fulfilled, where

$$R_L = \frac{r_{\cdot} \times C - R_c \times D}{A^2 + B^2} \quad X_L = \frac{X_{\cdot} \times C - X_c \times D}{A^2 + B^2} \quad \text{(Exp.5)}$$

$$r_{\cdot} = \frac{R_0 X_0^2}{R_0^2 + X_0^2}, \quad X_{\cdot} = \frac{X_0 R_0^2}{R_0^2 + X_0^2}, \quad X_0 = \frac{1}{\cdot C_0\left(\frac{\cdot^2}{\cdot_0^2} - 1\right)}, \quad X_c = \frac{1}{\cdot C_c}$$

$$A = r_{\cdot} - R_c, \quad B = X_{\cdot} - X_c, \quad C = R_c^2 + X_c^2, \quad D = r_{\cdot}^2 + X_{\cdot}^2$$

Q represents resonance frequency which is a ratio of a real number to reactance shown by the ω_0 in the (Exp. 4), RL represents the negative resistance for oscillating the series arm consisting of L1/C1/R0 of the oscillator, XL represents reactance, Cc represents circuit capacitance of the oscillation circuit, and ω represents oscillation angular frequency, and

(Exp. 5) represents negative resistance and load capacitance for oscillating a series arm consisting of L1/C1/R0 of the oscillator.

6. A high-frequency piezoelectric oscillator according to any one of claims 1, 2, 3, and 4, wherein

the resistance within a range according to claim 5 is organized within an inductor, and the inductor having the inductor and the resistor integrated together is connected in

parallel to the interelectrode capacitance C0 of the vibrator.